



DOE Hydrogen Program

U.S. Department of Energy Hydrogen Program

The President's Hydrogen Fuel Initiative commits \$1.2 billion over five years to research, develop, and demonstrate hydrogen and fuel cell technologies. Under the President's Hydrogen Fuel Initiative, the U.S. Department of Energy (DOE) Hydrogen Program integrates related activities in the Offices of Energy Efficiency and Renewable Energy; Fossil Energy; Nuclear Energy, Science, and Technology; and Science.

The DOE Hydrogen Program

- ▶ Works with the automotive and energy industries, universities, national laboratories, federal agencies, international partners, and others to overcome critical technical barriers to developing commercially viable, emissions-free hydrogen fuel cell vehicles and infrastructure technologies. If these research efforts succeed in meeting technical targets and industry can begin to realize a business case, hydrogen fuel cell vehicles could begin to reach the commercial mass market in the 2020 timeframe.
- ▶ Focuses on hydrogen fuel cells for transportation to
 - (1) achieve self-reliance in energy, and
 - (2) ensure environmental quality for future generations.

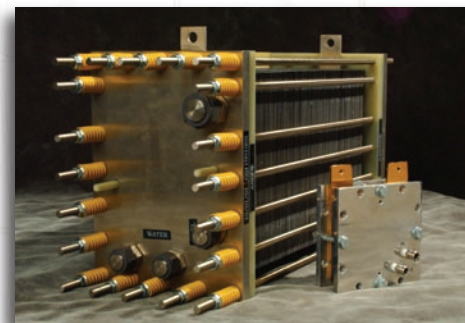


President George W. Bush talks with Rick Scott, Operations and Safety Coordinator, Shell Hydrogen, LLC, as they refuel a hydrogen fuel cell vehicle, Wednesday, May 25, 2005, at a Washington, DC Shell Station.

White House photo by Paul Morse

Hydrogen Fuel Cells Can Enhance Energy Security

- ▶ Currently, 55% of our oil comes from foreign sources; that figure is projected to rise to 68% in 2025. Considering that two-thirds of the oil we consume is used for transportation, it is clear that transportation needs must drive our energy security efforts.



The chemical reaction in a single fuel cell produces less than 1.16 volts of electricity; many separate fuel cells can be combined into fuel cell "stacks."

Photograph courtesy of Matt Stiveson



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- ▶ Long-term energy security will be achieved by *substituting* other fuels and propulsion technologies for gasoline-powered internal combustion systems.
- ▶ We can produce hydrogen in plentiful quantity from diverse domestic resources.
- ▶ Hydrogen fuel cell vehicles have the potential to be highly efficient and minimize the energy needed to power our cars and light trucks.

Hydrogen Fuel Cells Offer Environmental Benefits

- ▶ A hydrogen fuel cell vehicle is a zero-emissions vehicle — it emits only water vapor. This is especially important in urban areas where vehicles contribute significantly to air emissions.
- ▶ The amount of water vapor released by a hydrogen fuel cell vehicle is approximately the same as that released by a vehicle powered by a gasoline internal combustion engine.
- ▶ Hydrogen fuel cell vehicles have the potential to eliminate carbon emissions from the entire fuel cycle. Specifically,
 - Hydrogen produced using renewable resources and nuclear energy results in virtually zero greenhouse gas emissions.
 - Hydrogen produced from coal using carbon capture and sequestration technologies results in virtually zero greenhouse gas emissions.

In the Near Term...

- ▶ Hybrid-electric technology is becoming commercially competitive today and hybrid-electric vehicles (HEVs) are now available to consumers. Further research will improve the affordability and performance of this important “bridge” technology.
- ▶ In the short term, using highly efficient HEVs will decrease oil consumption, but not sufficiently to serve as a long-term solution. Widespread use of HEVs can reduce the overall rate of growth of oil consumption but will not reduce oil use below today’s level, due to projected increases in numbers of vehicles on the road and vehicle miles traveled.
- ▶ For the long term, the solution lies in the use of petroleum substitutes. Improved efficiency can only offset the growth in transportation energy demand; it can’t decrease oil use from today’s level. Therefore, substitution with an alternative fuel like hydrogen is necessary to improving energy diversity and achieving long-term energy security. Because hydrogen can be produced from diverse, domestic resources, it will make America self-reliant for future transportation energy.

Did you know...

Hydrogen is an energy carrier, not an energy source, meaning that it stores and delivers energy in a usable form.

Hydrogen can be produced using abundant and diverse domestic energy resources, including fossil fuels, such as natural gas and coal; renewable energy resources, such as solar, wind, and biomass; and nuclear energy.

A hydrogen economy would not only reduce our dependence on imported oil, but also benefit the environment by reducing emissions of greenhouse gases and criteria pollutants that affect our air quality.

The President’s Hydrogen Fuel Initiative accelerates the research and development of hydrogen, fuel cell, and infrastructure technologies that would enable hydrogen fuel cell vehicles to begin to reach the commercial market in the 2020 timeframe.

Under the President’s Hydrogen Fuel Initiative, the DOE Hydrogen Program works with industry, academia, national laboratories, and other federal and international agencies to overcome critical technology barriers, address safety issues and facilitate the development of model codes and standards, validate hydrogen fuel cell technologies in real world conditions, and educate key stakeholders in the transition to a hydrogen economy.